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Assessment of users' preferences for sawn wood species in Ibadan metropolis, Nigeria

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ABSTRACT

Users of wood still have preferences despite increasing reduction in the availability of wood species. This study was therefore carried out to assess the users' preferences for sawn wood species in Ibadan metropolis, Nigeria. A cross-sectional survey study, which employed questionnaire and on-site observations, was used. A sample of 210 respondents was purposively selected from twenty one associations' of sawn wood users comprising mixtures of active furniture makers and carpenters in five local government areas of Ibadan metropolis. Data were analysed using descriptive statistics such as percentages, frequency and ranking. Of the 27 species, users expressed the highest preference for *Gmelina arborea*, which ranked 1st with a frequency of 99.5%, and least preferred was *Funtumia elastica* with a frequency of 2.4%. Sawn wood users comprise furniture makers only (29.5%), carpenters only (2.9%), and combined furniture makers/carpenters (67.6%). Based on the wood conversion methods, 73.3% of users preferred wood from band-saw milling and chain-saw milling, 26.7% preferred wood from band-saw milling only, while none preferred wood from chain-saw milling only. Criteria for users' preferences for sawn wood species were durability (50%), workability (28.5%), and attractive colour of the species (22.5%). In addition, users expressed accuracy in dimension (62.9%), ease to work on (27.1%), and specification order by the final consumers (10%) as criteria for preferring sawn wood from band-saw milling to that from chain-saw milling. Efforts should be made to shift the consumption paradigm from reliance on natural forests to conservation approaches focusing on market oriented mass establishment of plantations of the preferred species.

Keywords: *Gmelina arborea*, sawn wood users, wood processing system, wood-based industries, users' preferences for sawn wood

INTRODUCTION

Forests and their woods have since provided essential products to humans. Nigeria, like most of the countries in the tropics, is endowed with forests of diverse wood species. However, overexploitation has rendered the country wood deficient. The managers of wood resources (Forests) have for many years neglected the crucial need for conservation, which has implications on sawn wood users' preferences. The neglect has resulted in poor tree diameter distribution and species composition, and in turn low availability of desirable wood species in the market and thus changes in users' preferences. Preferable indigenous timber species are relatively scarce and sawn woods from indigenous lesser-known and

exotic species are being heavily utilised. The economic activity of the forestry sector in Nigeria is centered mainly on the logging and production of sawn wood (lumber) through chain-saw milling and band-saw milling.

Wood-processing and allied industries represent a wide range of sectors and sub-sectors, which derive added value from wood-based (ligno-cellulose) renewable resources. These sectors and subsectors may be grouped into: (1) the solid wood, (2) the refined wood, and (3) the wood fibre-based (EUROSTAT, 2012) of which apparently, the sawn woods are the most important products, re-processed, traded and consumed in Nigeria. Furniture makers and/or carpenters constitute the major users of sawn woods directly from timber processing industry. They have vast knowledge about the woods, their structures and properties. They usually remain viable with positive cash flow because they produce products from renewable resource that are in constant demand among the general populace. In the last one and half decades, the furniture industry has been reported to have represented about 80% of the wood-based industries (Abdullahi, 1999) in Nigeria. It is also considered as the most widely distributed of all wood-based industries in Nigeria (Aiyeloja *et al*., 2010). The sawn wood users are aware of the trend of wood species availability status, and they stand as technical advisers and producers of final products to the consumers. With the attendant deficit of desirable wood species, many underrated species have been explored and their behaviour studied under indoor services over time. The available timber species then become objects of many applications but some are preferred to others.

Wood being an important versatile biological construction material, the structures and properties of wood determine its best use. Woods have properties that can significantly or remarkably influence its usefulness to end users of products: notably, inherent natural resistance to degradation agents, colours, workability, and perhaps weight. These properties are quality indicators which ultimately dictate wood suitability and its preference for varying uses. One of the relying factors influencing the choice of sawn woods in Nigeria has been mainly based on the indigenous knowledge experience of their strengths even to date. As such crucial indigenous knowledge of the strengths of the wood species utilisation is not in doubt as these have been demonstrated in many indigenous wood species without prior scientific assessment. However, the inadequate supply of these timber species has exposed the users to consumption of new timber species. Factors (properties) that account for the preferences of sawn wood species usually differ for varying utilities.

Several sawn wood consumption-based studies have already been carried out in relation to preferences for species across the globe (Luppold, 1983; Bullard, Doherty and Short, 1988; Pakarinen, 1999; Karki, 2000; Bigsby and Ozanne, 2001; Teisl, 2002; Vlosky and Shupe, 2002; ITC/ITTO, 2005; Sandberg and Johansson, 2005; Ilce *et al.*, 2010; Sood, 2014; Boampong *et al.*, 2015). All these studies reported divergent factors ranging from wood intrinsic factors to environmental labeling regarding the security of treated wood. Luppold (1983) and Bullard *et al.* (1988), in their extensive studies revealed high preferences for open-grain species such as Oak, Cherry, Maple, etc for bedroom and Youth furniture in Mississippi, as well as environmental labeling regarding the security of treated wood in US (Teisl, 2002; Vlosky and Shupe, 2002). Pakarinen (1999) and Sandberg and Johansson (2005) found aesthetic texture, appearance, surface colour nuance and

annual ring orientation as key factors in Sweden. Karki (2000) indicated design, species, price, green attributes and finishing, in that order as effective factors for choice of furniture in Southern Germany. In New Zealand, the forest type from which the wood for furniture is obtained (plantation preferred to natural forest), irrespective of environmental labeling, and the warranty period, influence the consumer preferences (Bigsby and Ozanne, 2001). The preference trend has been towards lighter colours in China (ITC/ITTO, 2005). Ilce *et al.* (2010), found surface figure as the most important factor influencing the choice of furniture products in Turkey. In India, wood users have a strong preference for hardwoods that are perceived to be more resistant to termites and decay as well as dark tropical woods (Sood, 2014). Boampong *et al.* (2015), reported durability, appearance and processability as the most influential factors in the selection of wood for furniture and joinery products in Ghana.

Few studies on the influential factors governing the choice and preference of sawn woods for specific and varying uses in Nigeria have also been reported. Aiyeloja *et al.* (2010) revealed that timber price, durability, workability and availability were among the key determinants, which influenced preference for lesser-known wood species among cabinet-makers in Oyo and Osun States. Similarly, Arowosoge and Tee (2010) indicated durability, design/finishing, colour/grain, and wood species as key factors influencing consumer's choice for wooden dining furniture in Lagos, Ibadan and Osogbo. More recently, Adebara *et al*. (2014) showed availability, customer's preference, strength, and appearance as dominant factors for the utilisation of timber species for building construction in Minna. While these studies predominantly provided information on wood species abundance indicator and properties as influential factors, this study further included preferences based on the wood conversion processing methods, categorisation of users based on products differentiation, and set forth recent information that would guide the sawn wood users, and serve to reinforce massive plantations and conservation of preferred sawn wood species in Nigeria.

METHODOLOGY

Study area

The study area comprises Ibadan North, North-east, North-west, South-east, and South-west local government areas within Ibadan metropolis, Oyo State, Nigeria (Latitudes 7^{o} 20' 03" and 7^{o} 26' 12" N, Longitudes 3^{o} 51' 65" and 3^{o} 56' 48" E) as shown in Figure 1. Ibadan is a metropolitan city having varying scales of Furniture /carpentry enterprises constructing different types of wood products ranging from household items to building construction such as trusses. The Furniture Makers/Carpenters Associations from which respondents were selected are presented in Table 1. Ibadan, the headquarters of Oyo State, is the largest city in Nigeria harbouring many fringes of natural and artificial forests. The City enjoys the supply of raw timber from neighbouring towns within and outside the State. Within the City, sawmilling has always been the main source of sawn wood delivery for users. Sawn woods are mainly produced from timber species sourced from the natural forests within the region. Sawn woods are utilised for a variety of purposes and its utilisation form a major part of the many subsistence activities at informal economic level in the city.

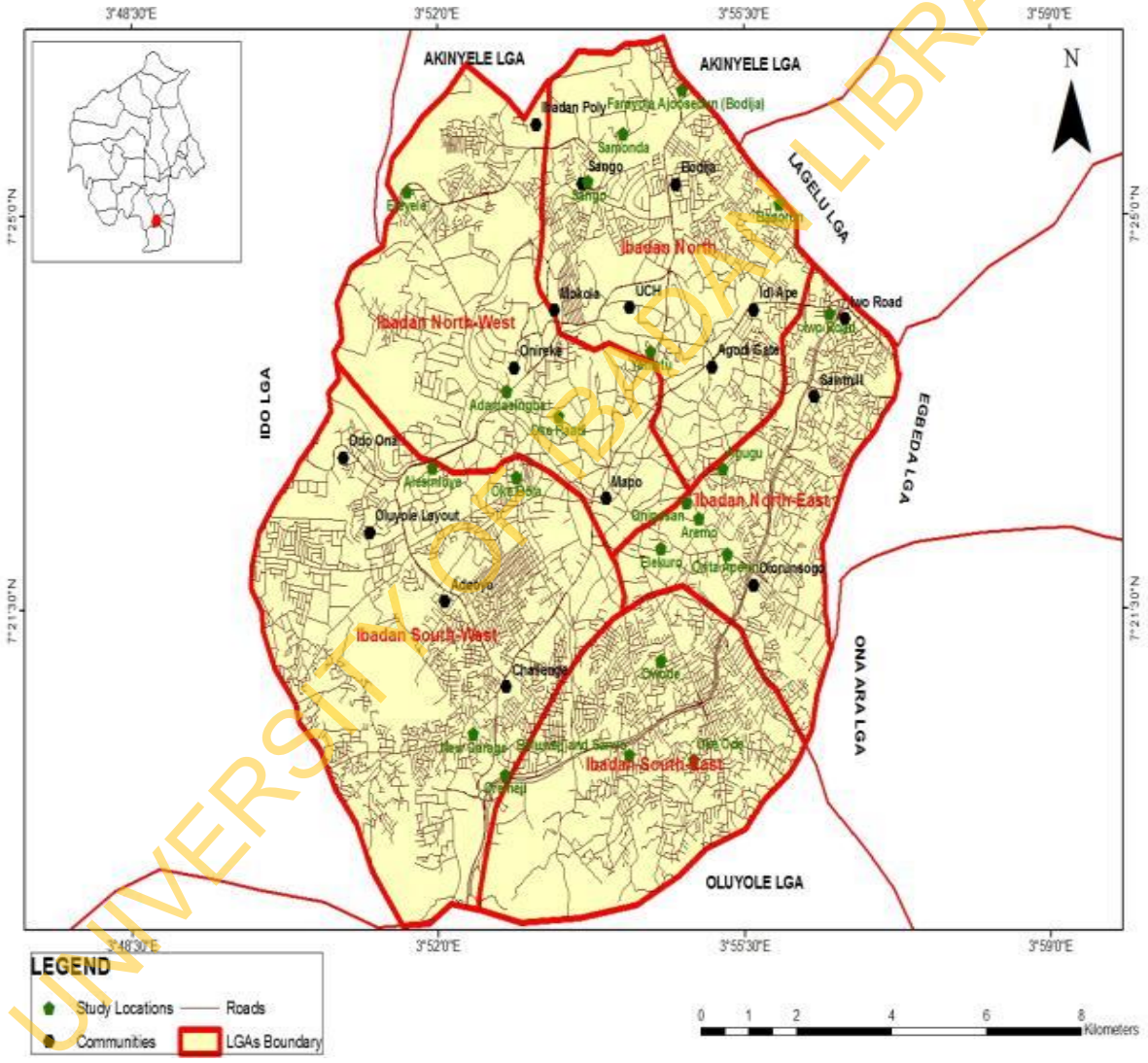

Fig. 1: Map of Ibadan Metropolis showing the selected study areas

Table 1: Names and Coordinates of the Selected Furniture Makers'/Carpenters' Associations

S/N	NAMES OF ASSOCIATIONS	LONGITUDE	LATITUDE
1	Adamasingba	3° 52' 79"	7° 23' 44"
2	Agugu	3° 55' 26"	7° 22' 75"
3	Alesinloye	3° 51' 94"	7° 22' 76"
4	Aremo	3° 54' 98"	7° 22' 30"
5	Basorun	3° 55' 87"	7° 25' 10"
6	Boluwaji Sanyo	3° 54' 19"	7° 20' 19"
7	Elekuro	3° 54' 55"	7° 22' 04"
8	Eleyele	3° 51' 65"	7° 25' 21"
9	Farayola Ajooosedun	3° 54' 79"	7° 26' 12"
10	Iwo Road	3° 56' 48"	7° 24' 12"
11	New Garage	3° 52' 40"	7° 20' 39"
12	Oke Bola	3° 52' 89"	7° 22' 67"
13	Oke Ode	3° 54' 92"	7° 20' 16"
14	Oke Paadi	3° 53' 38"	7° 23' 21"
15	Onipasan	3° 54' 84"	7° 22' 44"
16	Oremeji	3° 52' 76"	7° 20' 03"
17	Orita Aperin	3° 55' 30"	7° 21' 99"
18	Owode	3° 54' 54"	7° 21' 04"
19	Samonda	3° 54' 12"	7° 25' 73"
20	Sango	3° 53' 72"	7° 25' 30"
21	Yemetu	3° 54' 44"	7° 23' 79"

DATA COLLECTION

The study was carried out among selected 210 active sawn wood users purposively sampled from a total of twenty-one sawn wood user's associations' territory (ten from each association) comprising of Furniture Makers and Carpenters in 2013. The questionnaire administration was based on a list of salient questions designed to address few variety of themes: preferred sawn wood species, influential factors of preferences, categories of sawn wood users, preferences for sawn wood based on conversion processing methods. A total number of 210 questionnaires were administered, collected on the spot, collated and then analysed by means of descriptive statistics. Users' preferences for sawn wood species were ranked following the methods of Arowosoge *et al.* (2009), and Aiyeloja *et al.* (2010).

RESULTS

Users' preferences for sawn wood species

Of the 27 wood species available to users in the markets, almost all the users showed preference for *Gmelina arborea* while *Funtumia elastic* wood was least preferred as shown in Table 2.

Table 2: Preference rating of sawn wood species utilized by sawn wood users

Scientific Names of Sawn wood spp	No of Time Mentioned	% Mention	Rank
Gmelina arborea	209 [210]	99.5%	1st
Khaya spp	206 [210]	98.1%	2nd
Tectona grandis	205 [210]	97.6%	3rd
Cordia millenii	202 [210]	96.2%	4th
Mansonia altissima	201 [210]	95.7%	5th
Antiaris toxicaria	198 [210]	94.3%	6th
Pterygota macrocarpa	195 [210]	92.9%	7th
Aningeria robusta	120 [210]	57.1%	8th
Terminalia superba	100 [210]	47.6%	9th
Naulea diderrichii	95 [210]	46.6%	10th
Holarrheria floribunda	98 [210]	45.2%	11th
Celtis zenkeri	92 [210]	43.8%	12th
Albizia coriaria	90 [210]	42.9%	13th
Triplochiton scleroxylon	88 [210]	41.9%	14th
Anogeissus leocarpus	85 [210]	40.0%	15th
Milicia excels	80 [210]	38.1%	16th
Ceiba pentadra	75 [210]	35.7%	17th
Brachystegia eurycoma	68 [210]	32.4%	18th
Entandrophragma spp	68 [210]	32.4%	18th
Afzelia Africana	65 [210]	31.0%	20th
Daniellia oliverii	63 [210]	30.0%	21th
Alstonia boonei	62 [210]	29.5%	22st
Ficus mucuso	60 [210]	28.6%	23nd
Pycnanthus angolensis	50 [210]	23.8%	24rd
Holoptelea grandis	40 [210]	19.0%	25th
Cola spp	20 [210]	9.5%	26th
Funtumia elastic	5 [210]	2.4%	27th

Note: Figures in brackets are the total numbers of respondents.

Categorisation of Sawn wood Users based on Products Differentiation

Based on products differentiation, sawn wood users were categorised into: 1) furniture makers only, (tables, chairs, interior and exterior decorations, cabinet, doors and windows), 2) carpenters only (roofing, decking, scaffolding and building constructions), and 3) combined furniture makers/carpenters. This result is presented in Table 3.

Table 3: Distribution of Sawn wood Users in categories at Ibadan metropolis based on product differentiation

Categories of sawn wood users	Frequency	Relative Frequency (%)
Furniture makers only	62	29.5
Carpenters only	6	2.9
Combined Furniture makers/Carpenters	142	67.6
Total	**210**	**100**

Preference criteria for sawn wood species in Ibadan metropolis

Preference criteria for sawn wood selection and utilization in Ibadan metropolis are grouped into two main categories namely; criteria based on wood properties, and criteria based on production methods. The two categories are presented in Tables 4 and 5 respectively. Based on wood properties, the most important criterion was durability, followed by workability and colour (Table 4). Based on production methods, majority of the wood users (73.3%) preferred wood from band-saw and chain-saw milling (Table 5).

Table 4: Factors of preferences for sawn wood species in Ibadan metropolis based on wood properties

Factors	Frequency	Relative Frequency (%)
Durability	105	50.0
Workability	60	28.5
Colour	45	22.5
Total	**210**	**100**

Table 5: Factors of preferences for sawn wood species in Ibadan metropolis based on production methods

Production methods	Frequency	Relative Frequency (%)
Sawn wood from band-saw milling only	56	27.7
Sawn wood from chain-saw milling only	0	0.0
Sawn wood from band-saw milling and chain-saw milling	154	73.3
Total	**210**	**100**

DISCUSSION

The relatively higher preference for *Gmelina arborea* over other sawn wood species by sawn wood users in the Metropolitan City is not unexpected. Aiyeloja *et al.* (2010) also reported similar findings about *Gmelina arborea* wood among the Cabinet-makers in Oyo and Osun States. This result was also observed and its abundance or availability in the region coupled with its renowned unique characteristics makes the species a suitable material for many applications. Its uses among others include roofing, production of cabinets, construction of many different sizes of wood products and structures in different workshops and construction sites in

the metropolis. The species has been considered as one of the most widely cultivated and distributed exotic wood species and many have benefited from the wood (Aiyeloja *et al.*, 2015). The failure of the primary objective of the massive plantations of species in Ogun and Ondo State for pulp and paper utility has exposed its wood potentials and multi-purposefulness even better than many indigenous trees. Since 1998, when its wider suitability for several applications was revealed, logs of wood for many Nigerian wood based industries have been supplied predominantly from *Gmelina* plantation forests (Aiyeloja *et al.*, 2015). *Gmelina arborea* has gained widespread popularity more recently as a multipurpose tree mainly for timber and landscaping across the country. Generally, there is an increasing decline in wood delivery, but *Gmelina arborea* wood is apparently still more abundant and highly prized than many wood species of its utility class. The increasing decline might still persist for long because efforts have not been fully placed towards conserving, establishing, and revamping our dying plantations. The reduced availability of indigenous species coupled with poor establishment of these species in plantations perhaps explains the low utilisation of their woods. The past massive industrial plantations of Gmelina in the region explain the moderate availability of its wood for highest preference use. Domestications of indigenous wood species have been relatively poor if not absent in Nigeria. On the account of the total numbers of wood species utilised, this result (27 wood species) compared well with those of Arowosoge *et al.* (2009), which reported 28 wood species for furniture factory in Ibadan. The result however, was substantially lower to those of Aiyeloja *et al.* (2010) which documented 49 wood species being utilised in Oyo and Osun States. This variation could be attributed to the data that were pooled together with Osun State, which Popoola *et al*. (2001) and Umeh (2005) arguably considered as the richest timber producing state in South-west region of Nigeria.

Wood qualities like durability, workability and colour appreciatively determine the selection and utilization and wood species in Ibadan metropolis. Gmelina wood, which was most preferred within Ibadan metropolis demonstrated possession of these intrinsic properties. According to Asouti and Fuller (2008), the physical properties of *Gmalina arborea* among others include easily workable, verily durable under water. This result therefore corroborates those of Barany *et al.* (2003), Aiyeloja *et al.* (2010), Arowosoge and Tee (2010), Sood (2014), Boampong *et al*. (2015) which pointed out durability as one of principal determinants of sawn wood species preferences. Responses received from the users showed that they were conversant with the important role of wood durability, workability and colour in wood utilisation and consumption. From careful observations and studies, Gmelina wood has demonstrated its excellent long term usage (durability) for varying indoors applications. Aiyeloja *et al.* (2015) reported that a more than 40 year old talking drum in Ibadan is still in use because of the excellent physical properties of the Gmelina wood it was made from. The wood is resistant to degradation, insects attack and splitting. Further evidences are also shown of the long term (over 15 years) usage of sound shelves and ceilings made of Gmelina wood in Abeokuta, Ogun State. The wood was ease to work on as it possessed decorative values (white colour, fine figure and texture) as well as excellent acceptance of fillers, stains and finishes. These excellent attributes has made Gmelina wood to stand out among the indigenous and exotic wood species in Nigeria including all the

indigenous white woods. Nigerians in the past has considered brown colour as indicative of overall quality due to the poor attributes of our indigenous white woods such as *Ceiba pentandra, Triplochiton scleroxylon, Vitex doniana, Bombax buonoponense, Ficus mucuso, Funtumia elastica* etc. *Gmelina arborea* has however changed this.

The preferences of sawn wood from band-saw milling to chain-saw milling were attributed to the accuracy in dimension, ease to work on, and specification order by the consumers. Cheaper price was the only given reason by the respondents that utilised sawn wood from both band-saw milling and chain-saw milling. These results indicated that cheaper lumber can be obtained from chain-saw milling for items not requiring accuracy and thus help to meet many local demands of low standard requirement uses as well as allowing unusual timber cut for local enterprises development (Eldred, 2000) including carving, wood game products, mortal and drum productions that contribute to local and national economy development.

CONCLUSION

Gmelina arborea was the most preferred wood species by sawn wood users in Ibadan metropolis because of its availability and excellent physical properties. The criteria for the selection and utilization of wood species in Ibadan metropolis include durability, workability, colour, and these were categorised into the physical properties and production methods.

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